

Name: _____ Date: _____

Answer Key: Shatter the Fossil Record: A 7th Grade Deep Time Challenge

Students synthesize paleoclimatic data and apply the Law of Faunal Succession to reconstruct fragmented geological histories.

1. An outcrop reveals a layer of shale containing fossils of the Glossopteris fern in both Antarctica and India. What synthesis can be made regarding the Paleozoic environment of these now-distant continents?

Answer: A) They were once part of a contiguous landmass with a similar temperate climate.

The presence of the same specialized flora across disjointed continents provides evidence for plate tectonics and the former existence of the supercontinent Gondwana.

2. In a sequence of undisturbed sedimentary rock, a geologist finds a layer of volcanic ash. This ash serves as a(n) _____, allowing scientists to assign an absolute age to the fossil layers above and below it.

Answer: B) Key bed

A key bed is a thin layer of rock (like volcanic ash) that is easily recognized and covers a large area, providing a precise chronological marker in the geologic record.

3. True or False: The principle of faunal succession implies that fossil organisms succeed one another in a definite and determinable order, regardless of where they are found globally.

Answer: A) True

This principle allows geologists to identify the relative age of rock layers across different continents by matching the specific vertical sequence of fossils found within them.

4. Which scenario would most likely lead to the creation of a carbon film fossil of a Ginkgo leaf?

Answer: C) Compression in fine-grained sediment where liquids and gases are squeezed out.

Carbonization occurs when intense pressure from overlying sediments removes organic liquids and gases, leaving a thin residue of carbon that outlines the organism.

5. While searching a limestone quarry, you find a 'molded' cavity of a brachiopod shell, but the original shell material is gone. If minerals later fill this cavity and harden, the resulting fossil is called a _____.

Name: _____ Date: _____

Answer: C) Cast

A cast is formed when a mold (the hollow impression) is filled with minerals or sediment, creating a 3D replica of the exterior of the original organism.

6. True or False: An unconformity in the rock record represents a continuous, uninterrupted 'tape recording' of Earth's biological history without any gaps in time.

Answer: B) False

An unconformity represents a 'missing page' in Earth's history, caused by periods of erosion or non-deposition where no rock (and thus no fossil record) was preserved.

7. Using the concept of 'half-life,' if a sample of basalt contains only 25% of its original Potassium-40 (and 75% Argon-40), how many half-lives have passed since the rock cooled?

Answer: B) Two half-lives

After one half-life, 50% remains. After two half-lives, 50% of that 50% (which is 25%) remains.

8. A researcher discovers fossils of benthic (bottom-dwelling) foraminifera in a mountain range. This discovery prompts the conclusion that the region underwent _____ uplift over millions of years.

Answer: B) Tectonic

Tectonic forces, such as the collision of plates, can push the sedimentary rock layers formed on the ocean floor high into the atmosphere to form mountains.

9. Why are organisms with hard parts, like the calcified shells of ammonites, significantly more common in the fossil record than soft-bodied organisms like jellyfish?

Answer: B) Hard parts are more resistant to decay and mechanical weathering.

Biological preservation is biased toward organisms with durable structures; soft tissues are usually consumed or decomposed before they can be buried and mineralized.

10. True or False: If a specific fossil species is found to have lived for only a very short, well-defined period of geological time, it is considered a poor candidate for an index fossil.

Answer: B) False

Actually, the opposite is true. The best index fossils are those that were geographically widespread but only existed for a short duration, allowing for precise dating of rock layers.

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